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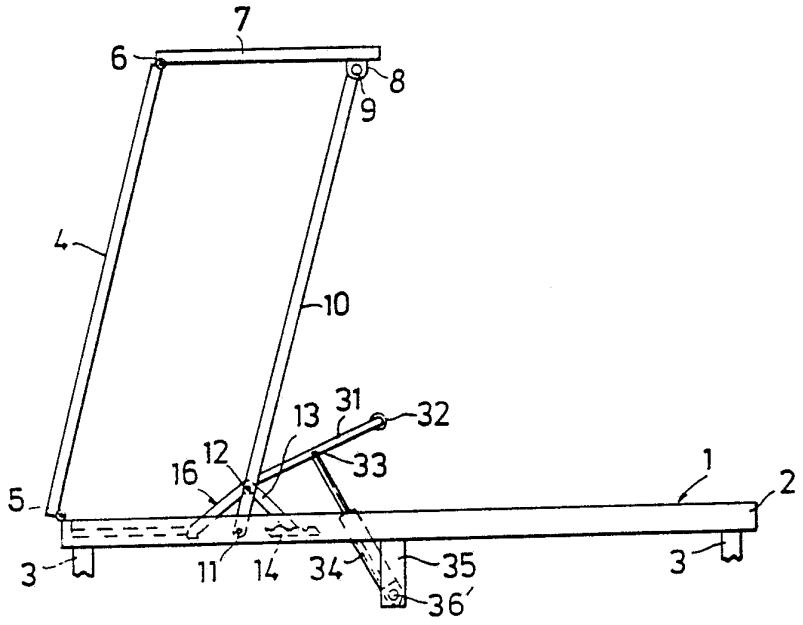

(57) Abstract

A table construction which makes possible work in a sitting position as well as in a standing position comprises two table tops (4, 7) hingedly connected to each other and together with a link (10) and part of a base frame (1) forming a parallel arm structure with one of the table tops (7) substantially horizontal irrespective of the angular position of the second table top. Pivotally connected to the link (10) is a catch arm (13) which cooperates with a catch means (14) provided at the base frame. A resilient support arm (16) counteracts the folding up of the link when the latter approaches its uppermost position and maintains the catch arm in a safe engagement with the catch means.

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IMPROVEMENT IN TABLE CONSTRUCTIONS

The present invention refers to an improvement in table constructions.

Recently table constructions have been suggested in which one or several table tops are so connected to a table stand that they can be inclined to form desk-like units or sections. This depends upon the knowledge about the reaction of the human body to different positions of work.

However, these known table constructions have only partly been able to fulfill the requirements which such knowledge raises upon work tables.

For instance it has not been possible without complicated, heavy and expensive constructions to produce work tables which are suited for work in sitting as well as standing position and the stability has in most cases been unsatisfactory.

Another drawback with the solutions presented is that in most cases it has been necessary to use bulky structures with downwardly extending parts which encroach upon the space for the legs and which may cause damages to the knees of the user.

The object of the invention has thus been to provide a table construction of the kind referred to which does not suffer the mentioned drawbacks and which may be produced at a low cost.

In order to accomplish these and other objects the invention has the characteristics which appear from the patent claims.

The accompanying drawing illustrates an exemplary embodiment of the invention in which

Fig. 1 is a schematic side view of a table construction according to the invention and set for work in a sitting position.

Fig. 2 is a similar illustration but with the table construction set for work in a standing position.

Fig. 3 shows in perspective and on an enlarged scale part of a unit forming part of the table construction while

Fig. 4 also in perspective shows certain of the parts which form part of the unit according to fig. 3 and

Fig. 5, finally in perspective shows a part of fig. 4.

The new table construction comprises a base frame generally designated as 1, which may be of any suitable kind and is here illustrated by means of a table stand which consists of a rectangular frame 2 supported by a number of legs 3. The parts of the table constructions may be connected to such a base frame but in the embodiment to be described in connection with fig. 3-5 inclusive the majority of said parts are assembled to a unit which in an easy manner may be connected to a base frame such as a table stand. The advantage with such units is of course that they may be fully produced at a factory and then rapidly and with a minimum of effort may be built in already manufactured furniture or furniture stands.

As appears from fig. 1 and 2 a first table top 4 is hingedly connected to the front edge of a table stand 1 by means of a hinge 5. Said first table top is in turn by means of a hinge 6 hingedly connected to a second table top 7. The latter has at the lower surface thereof bearings 8 for a pivot shaft 9, by means of which a link 10 is pivotally connected to the table top 7. The link 10 is at the opposite end thereof at 11 pivotally connected to the table stand and the pivot shafts are so chosen that the table tops 4 and 7 and the link and the part of the base frame which is located between the pivot points 5 and 11 together will form a parallel link system.

Pivotally connected to the link 10 at 12 is a catch arm 13 which in combination with a catch means 14 connected to the base frame can bring forth a locking of the link 10 and consequently the entire parallel link system in various angular positions.

As appears from fig. 5 the catch arm 13 near to one end thereof has projections 15 extending therefrom in opposite directions and which may consist of a dowel which penetrates the arm and is secured thereto for instance by a press fit and a support arm 16 (fig. 3) is also pivotally mounted about the same axis as the catch arm 13.

As initially mentioned most of the components of the device are assembled to a unit which is partly shown in fig. 3 and there has the general designation 17.

This unit comprises a channel bar 18 which preferably bridges the distance between two opposite sides of the frame 2 and may be secured to said frame by simple means.

The pivot shaft 11 extends through the flanges of the channel bar. In order that the table tops 4 and 7 in the fully lowered position thereof may rest upon the upper edge portion of the flanges 18 of the channel bar the pivot shaft 11 is situated at a distance below said edge portion and for the same reason the pivot shaft 9 is situated a corresponding distance below the bottom surface of the table top 7.

One end of the channel bar has an end closure 19 and at a distance therefrom there are to the web portion of the channel bar 18 secured two mutually parallel angle irons 20a,20b which have the vertical flanges thereof facing each other.

At each of said vertical flanges there is secured a plate 21a and 21b respectively, which has a number of recesses 22 extending from the upper surface thereof and for a purpose to be described.

In that portion of the channel bar which is located below the plates 21a,21b the web portion thereof has an opening 23, through which there projects one end of a leaf spring 24, the opposite end of which being secured to the under side of the bar by means of a screw 25, a rivet or the like. As appears from fig. 4 the leaf spring has an oblique end portion. Between the flanges of the U-beam 18 there is secured a rod 25, which has a transverse, central hole, through which extends a thinner portion 26 of a rod 27 which serves as a guide for a compression spring 28, having a length which is considerably bigger than the thicker portion of the rod 26. Thus the spring 28 will be guided in part of its extension and has one end thereof acting against the rod while the opposite end thereof comes into contact with the support arm 16 when the link 10 is swung upwardly as appears from fig. 3.

Thus the spring may be compressed to an extent which corresponds to the difference in length between the spring and the thicker portion of the rod 27.

The thinner portion of rod 27 is received in a bore 29 in the end piece 19, which means that the rod 27 will be correctly set and guided parallel to the web portion of the channel bar 18. The end piece 19 may also have holes 30 for fastening screws or the like for connection to the table stand.

To the link 10, which as appears from fig. 3 comprises two sideways spaced apart arms, there is pivotally mounted a lift arm 31 about the same shaft 12 as the support arm 16, said lift arm also comprising two sideways spaced arms and which at the free end thereof rotatably supports a roller 32.

At 33 there is hingedly connected to the lift arm the plunger of a gas cylinder assembly the cylinder of which being pivotally connected to a bracket 35 (see fig. 2) extending downwardly from the channel

bar in point 36, This cylinder extends through an opening 37 in the web portion of the bar 18.

As appears from fig. 1 the lift arm 31 via the roller 32 acts against the under side of the table top 4 as long as the table top only forms a minor angle with the horizontal plane. In order to be able to employ a small and thus cheap gas cylinder assembly it is of importance that the range of action thereof is limited and this is achieved according to the invention in that the gas cylinder assembly only acts during part of the raising phase and more particularly to incline the table top 4 within the relatively small angle region suitable for desk use, for instance 0-30°.

In order to reach the position of fig. 2 for work in a standing position the arm system is manually pivoted upwardly.

When setting for work in a standing position it is important that the second table top 7 which then serves as a work surface will be as steady as possible. To this end the spring influence via the support arm 16 just described is of utmost importance since this spring action will effect a locking which is substantially free of play and which cannot inadvertently be brough out of function.

The spring action causes the projection of the catch arm to be pressed into the actual recesses 22 of the plates 21a,21b.

When it is desired to set the table for desk function for work in a sitting position from the inactive position of the device where the table tops 4 and 7 rest against the frame 2 it is only necessary to release the gascylinder assembly and to bear against until the gascylinder assembly via the lift arm has brought the table top 4 to the desired position. When this position has been reached the gascylinder assembly is locked. If- from this position it is desired to set the table in a position suitable for work in a standing position it is

sufficient to lift up the table top 4 manually. At the end of this lifting movement this one has to be carried out against the resistance of the spring 28 acting upon the support arm 16. When swung upwardly the projections 15 slide against the upper surface of the catch plates 21a,21b and successively fall into the recesses 22 thereof. When the desired angle has been attained it is only necessary to release the table top and the spring force will bring the projection into a secure engagement with the recess 22.

When it is desired to reset the table to the position of fig. 1 it is only necessary to pull the table top 4 to such extent that the projection 15 of the catch arm passes the outermost recess 22 and behind (in the drawing to the left of) the catch plates 21a,21b. Then the catch arm 13 will fall down into the position indicated by dotted lines in fig. 4 where the projections 15 contact the wall portions of the web portion of the channel bar which limit the opening 23 sidewise. When the catch arm is displaced due to the folding down of the link and approach the position shown in full lines it will come into contact with the oblique part of the leaf spring 24 and during the continued forwards displacement thereof it will be influenced by the spring force exterted by the leaf spring. When thereafter the projections 15 pass over the right hand end of the catch plates 21a, 21b said spring force will swing the catch arm upwardly such that the projections 15 will be positioned above the lower edge portions of the catch plates 21a,21b. During the continued folding down the catch arm 13 will slide against the web portion of the channel bar and during the entire folding the projections will thus effect no catching action.

When the link is then swung upwardly the projections 15 will be in such a height position that they owing to the oblique end portions of the catch plates will slide up to the upper surfaces thereof and locking can again be accomplished in the manner described.

In order to fold down completely the table top 4 from for instance the desk position which is attained when the table top again comes

into contact with the roller 32 of the lift arm the gas cylinder assembly is again released which also causes the table top to be completely folded down. In some instances it is possible by proper dimensioning of the catch arm 13 relative to the link and by proper choice of pivot shaft and design of the catch plates effect locking within the desk region as well as within the region for work in a standing position without employing a gas cylinder assembly but in many cases it is more convenient to arrange two or several pairs of catch plates consecutively and at such distances from each other that the projections 15 may pass between the front edges of rear pairs of plates and the rear edges of front pairs of plates and it is of course also possible to arrange the locking at the minor angles which are actual in the desk use in another way.

The catch plates 21a,21b need not be secured to the angle bars 20a, 20b but may be pivotable in relation thereto and so designed that they while taking an oblique position with their front portion rest against the web portion of the channel bar 18 and are swung away by the projections when the catch arm is moved forwardly with the projections 15 acting against the under side of the catch plates. As appears from fig. 3 the main part of the device comprises a unit, which is provided to be connected to a table stand in a suitable manner. In addition to the shown end piece 19 it is then possible to use end pieces having parts embracing the base frame or the like. The end piece 19 as well as the catch plates 21a,21b and the support arm 16 may preferably be made by cutting metal profiles and also in other respects the invention may be varied within the scope of the claims.

In order to entirely eliminate the risk of an unwanted folding of the table tops primarily from the position for work in a standing position a catch arrangement according to fig. 3 may be employed.

In such an arrangement there is to the under side of the channel bar 18 at 35 pivotally mounted an arm 36, which at one end thereof has an upwardly directed dowel 37, which extends through an arcuate opening

38 in the web portion of the channel bar 18. The portion of the dowel 37 which extends over the web portion can owing to the movement of arm 36 engage a correspondingly shaped, downwardly open recess 39 in the base portion of the support arm 16 and it is thus seen that the dowel with the arm 36 in said position will make it impossible for the table tops to be folded from their uppermost position. The left end of the arm of course serves as a handle to bring the catch into active respectively inactive position.

A locking of the kind referred to may of course include more than one height position for instance when the base portion of the support arm is made wider and is provided with more recesses 39. The arm 36 further has a detent device, for instance a spring-influenced ball, which by snapping into recesses in the under side of the channel bar may be arrested in active respectively inactive positions.

CLAIMS

1. Improvement in table constructions, comprising two table tops (4,7) which are hingedly connected to each other in such a manner that they in an initial position are located in the same plane and behind each other, c h a r a c t e r i z e d in that one of the table tops (4) in one end is hingedly connected to a base frame (1) and in the opposite end thereof is hingedly connected to the second table top (7), that the latter by means of a link (10) is connected to the base frame (1) in such a manner that the second table top (7) will maintain a substantially horizontal orientation irrespective of the angle the first table top (4) takes with the horizontal plane and that the parallel arm system which is constituted by the table tops, the link and a corresponding part of the base frame is lockable in positions where the first table top (4) forms an acute angle with the horizontal plane with the second table top (7) substantially horizontal and located behind the first table top and in positions where the first table top (4) forms a substantially right angle with the horizontal plane and that further said first table top (4) has such an extension perpendicular to the pivot axis thereof that the second table top (7) in said second position will be located at a height suitable for work in a standing position.

2. Improvment as claimed in claim 1, c h a r a c t e r i z e d in that a catch arm (13) is pivotally connected to the link (10) and provided to cooperate for locking the link in one or several angular positions with a catch means (14) connected to the base frame (14).

3. Improvement as claimed in claims 1-2, c h a r a c t e r i z e d in that the catch arm (13) by means of a catch element (15) can lockingly cooperate with the upper surface of a catch plate (21a,21b) which for this purpose has recesses (22) in which said catch element may enter when the link is swung upwardly and that said catch element after having passed one end of the catch plate (21a,21b) falls down

below the catch plate in question and may pass under the catch plate to and beyond the opposite end of this one when the link is folded down without locking and then be caused to again be brought up to cooperate with the upper surface thereof.

4. Improvement as claimed in claims 1-3, c h a r a c t e r i z e d in that a resilient tongue (24) secured under the catch plate (21a, 21b) normally has the end portion of an oblique part thereof in resilient contact with the under side of the catch plate in one end thereof in order to lift up the catch element (15) of the catch arm (13) after the folding down of the link and bring it into cooperation with the upper surface of the catch plate (21a,21b).

5. Improvement as claimed in claims 1-4, c h a r a c t e r i z e d in that the catch element of the catch arm (13) consists of a pin (15) protruding from the arm and extending therefrom in both lateral directions and that the projecting pin portions each cooperate with a catch plate (21a,21b) secured to the vertical flanges of two mutually parallel walls the lateral distance between the catch plates only to a minor extent exceeding the thickness of the arm such that said pin portions may cooperate with the said catch plates and that said walls extend from a suitably U-shaped bar (18) between the vertical flanges of which the link (10) is pivotably mounted.

6. Improvement as claimed in claims 1-2, c h a r a c t e r i z e d in that the parallel arm system (4,7,2,10) at least during the end part of its folding upwardly is under influence of a spring force (28) which counteracts said upfolding and keeps the catch arm (13) in engagement with the catch means (14).

7. Improvement as claimed in claims 1-3, c h a r a c t e r i z e d in that a support arm (16) pivotally connected to the link (10) is so designed that it when the link is in its uppermost position will come into contact with a spring (28) supported by the base frame.

8. Improvement as claimed in claim 1, c h a r a c t e r i z e d

in that a lift arm (31) is pivotally connected to the base frame (1) and is provided to act with the free end thereof and via a friction reducing means such as a roller (32) against the under side of the first table top (4) and that said lift arm is in functional cooperation with an adjustable means (34) to bring and/or keep the lift arm to/into various angular positions, considerably inferior of 90° to the plan of the base frame in order to provide a desk with a slightly sloping table top and a horizontal table top in connection thereto and that further the link or the lift arm at a distance from the pivot centre (11) thereof to the base frame (1) has a second pivot centre (12) about which the catch arm (13) provided to lock the lift arm or the link in at least one position is pivotally mounted and provided not to cooperate with the catch means (14) provided at the base frame until the first table top (4) has been swung up substantially 90° from the base frame.

9. Improvement as claimed in claims 1-2, c h a r a c t e r i z e d in that the catch means consists of a pivotally mounted plate.

10. Improvement as claimed in claims 1-5, c h a r a c t e r i z e d in that the lift arm (31) is hingedly connected to one end of a gas cylinder assembly (34) the opposite end of which passing through an opening (37) in the channel bar (18) and in the free end thereof is hingedly connected to a bracket (35) positioned under the channel bar and that further the catch arm (13) is hingedly connected to the link (10) the lift arm (31) being provided to be swung up by means of the gas cylinder assembly an angle which is considerably less than 90° but that the link (10) may be manually swung up substantially 90°.

11. Improvement as claimed in claim 6, c h a r a c t e r i z e d in that a preferably manually operable catch device (35-39) is provided to lock the support arm (16) against displacement in any direction from at least one of its active positions.

12. Improvement as claimed in claims 1-6, c h a r a c t e r i z e d

in that at the lower side (at 35) of the bar (18) there is pivotally mounted an arm (36) which at one end thereof has an upwardly directed dowel (37) which passes through an arcuate opening (38) in the web portion of the channel bar (18) and that the portion of the dowel (37) which projects over the web portion by the pivot movement of the arm may be brought to project into a downwardly open recess (39) in the base portion of the support arm (16) for locking the support arm (16) against pivotal movement.

13. Improvement as claimed in claim 12, c h a r a c t e r i z e d in that the support arm (16) in the base portion thereof has two or more mutually parallel recesses (39) situated at such a distance from each other that the support arm by means of the arm (36) may be locked in positions corresponding to the locking positions caused by the catch means (14).

AMENDED CLAIMS
[received by the International Bureau
on 15 February 1990 (15.02.90);
original claims 1-13 replaced by amended claims
1-9 (4 pages)]

1. A table construction comprising a first table top (4) which at one end thereof is hingedly connected to a base frame (1) in such a manner that it may take various inclined positions relative to said base frame so as to enable a sitting person to perform work on said first table top, said first table top being further at the opposite end thereof hingedly connected to a second table top (7) and being designed as a part of a parallel arm system having a link (10) which is parallel to said first table top such that said link from an initial substantially horizontal position will be swung up to a substantially vertical position when said first table top is swung up 90^0 from the base frame (1) while said second table top takes a substantially horizontal position irrespective of the angle of said first table top, c h a r a c t e r i z e d in that said link (10) has pivoted thereto a catch arm (13) having a catch element (15) provided to cooperate with the upper surface of a catch plate (21a,21b) connected to said base frame at a distance from the pivot centre (11) of said link and remote from the pivot centre (5) of said first table top (4) so as to prevent the link from being swung down at least from said substantially vertical position towards said initial position, said catch plate (21a,21b) having in said upper surface at least one recess (22) in which said catch element (15) may enter and that said catch element after having passed one end of the catch plate (21a,21b) at an angle of said link slightly exceeding 90° may fall down below the catch plate and may pass under this one and beyond the opposite end thereof when said link is swung down towards said initial position such that said catch element again may be brought up to cooperate with the upper surface of said catch plate, said link (10) further having pivoted thereto a support arm (16) which by means of a manually releasable locking device (35-39) connected to the base frame and located between the pivot centre of said first table top and the pivot centre of said link in the active position of said locking device prevents the link from being swung up more than 90° but in the inactive

position thereof permits such motvement, that a spring element (28) is provided to act upon said link when the latter approaches and passes an angle of 90° from said initial horizontal position to urge said link into a position in which said locking device may lock said link and that said first table top (4) has such an extension perpendicular to the pivot axis thereof that the second table top (7) in said vertical position of the first table top (4) will be located at a height suitable for work upon said second table top (7) of a standing person.

2. A table construction as claimed in claim 1, c h a r a c t e r i z e d in that a resilient tongue (24) secured under the catch plate (21a,21b) normally has the end portion of an oblique part thereof in resilient contact with the under side of the catch plate in one end thereof in order to lift up the catch element (15) of the catch arm (13) after the folding down of the link and bring it into cooperation with the upper surface of the catch plate (21a,21b).

3. A table construction as claimed in claim 1, c h a r a c t e r i z e d in that the catch element of the catch arm (13) consists of a pin (15) protruding from the arm and extending therefrom in both lateral directions and that the projecting pin portions each cooperate with a catch plate (21a,21b) secured to the vertical flanges of two mutually parallel walls the lateral distance between the catch plates only to a minor extent exceeding the thickness of the arm such that said pin portions may cooperate with the said catch plates and that said walls extend from a suitably U-shaped bar (18) between the vertical flanges of which the link (10) is pivotably mounted.

4. A table construction as claimed in claim 1, c h a r a c t e r i z e d in that a spring element (28) acts upon the support arm (16).

5. A table construction as claimed in claim 1, c h a r a c t e r i z e d in that a lift arm (31) is pivotally connected to the base frame (1) and is provided to act with the free end thereof and via a

friction reducing means such as a roller (32) against the under side of the first table top (4) and that said lift arm is in functional cooperation with an adjustable means (34) to bring and/or keep the lift arm to/into various angular positions, considerably inferior of 90° to the plan of the base frame in order to provide a desk with a slightly sloping table top and a horisontal table top in connection thereto and that further the link or the lift arm at a distance from the pivot centre (11) thereof to the base frame (1) has a second pivot centre (12) about which the catch arm (13) provided to lock the lift arm or the link in at least one position is pivotally mounted and provided not to cooperate with the catch means (14) provided at the base frame until the first table top (4) has been swung up substantially 90° from the base frame.

6. A table construction as claimed in claim 1, c h a r a c t e r i z e d in that the catch plate is pivotally arranged.

7. A table construction as claimed in claims 1-5, c h a r a c t e r i z e d in that the lift arm (31) is hingedly connected to one end of a gas cylinder assembly (34) the opposite end of which passing through an opening (37) in the channel bar (18) and in the free end thereof is hingedly connected to a bracket (35) positioned under the channel bar and that further the catch arm (13) is hingedly connected to the link (10) the lift arm (31) being provided to be swung up by means of the gas cylinder assembly an angle which is considerably less than 90° but that the link (10) may be manually swung up substantially 90°.

8. A table construction as claimed in claims 1-6, c h a r a c t e r i z e d in that at the lower side (at 35) of the bar (18) there is pivotally mounted an arm (36) which at one end thereof has an upwardly directed dowel (37) which passes through an arcuate opening (38) in the web portion of the channel bar (18) and that the portion of the dowel (37) which projects over the web portion by the pivot movement of the arm may be brought to project into a downwardly open recess (39) in the base portion of the support arm (16) for locking the support arm (16) against pivotal movement.

9. A table construction as claimed in claim 8, c h a r a c t e r i z e d in that the support arm (16) in the base portion thereof has two or more mutually parallel recesses (39) situated at such a distance from each other that the support arm by means of the arm (36) may be locked in positions corresponding to the locking positions caused by the catch means (14).

Fig. 1

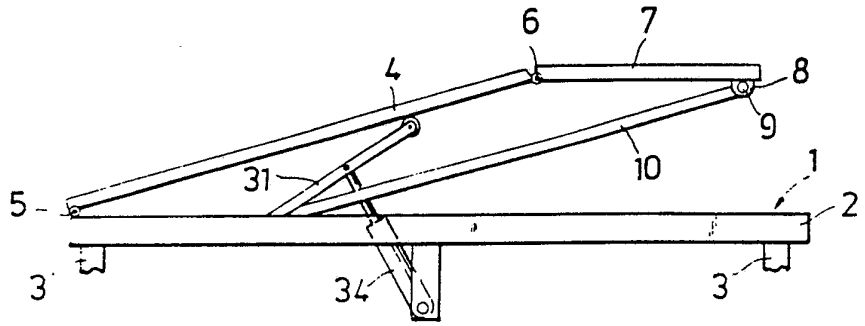
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Fig. 2

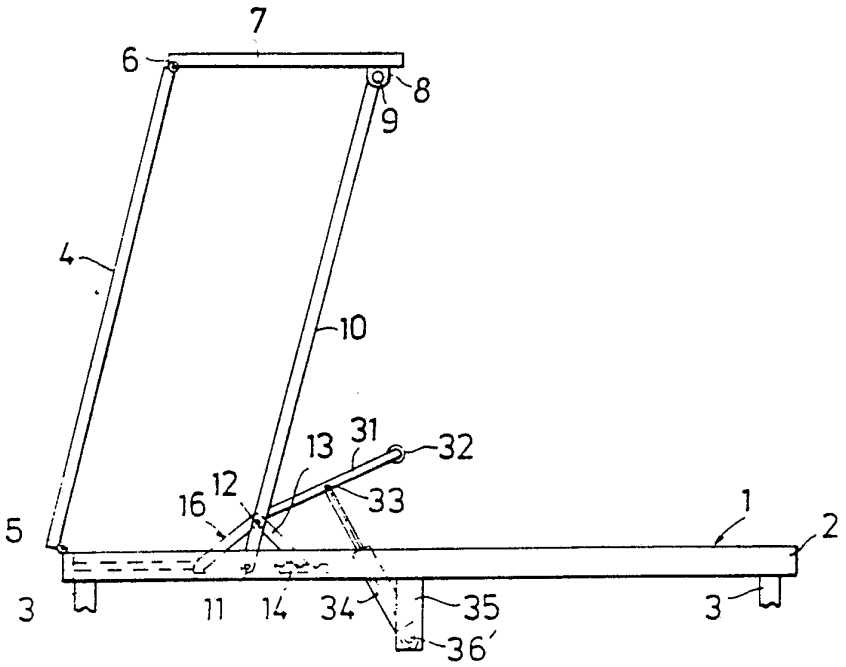
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Fig. 3

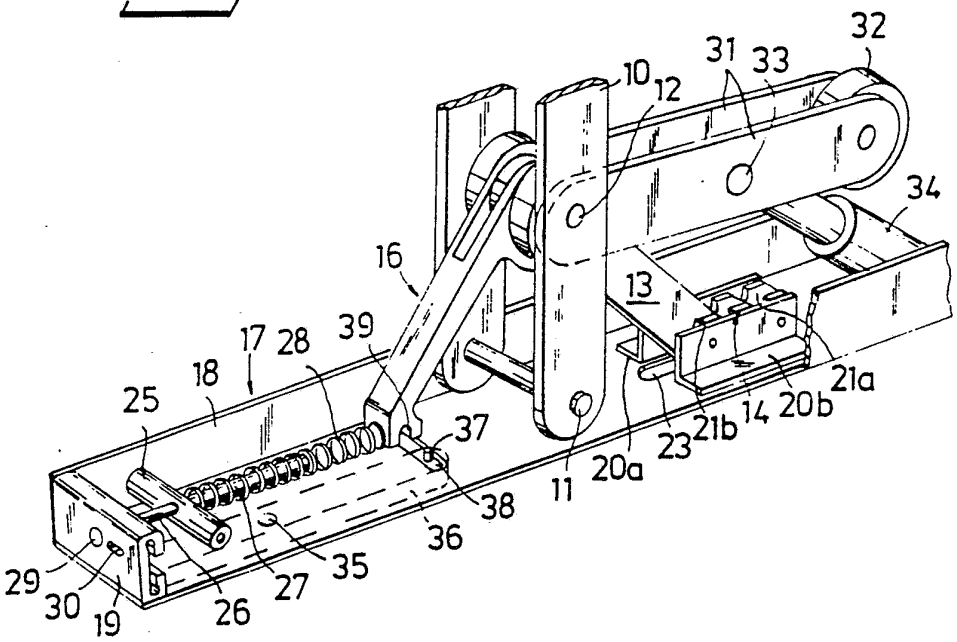


Fig. 4

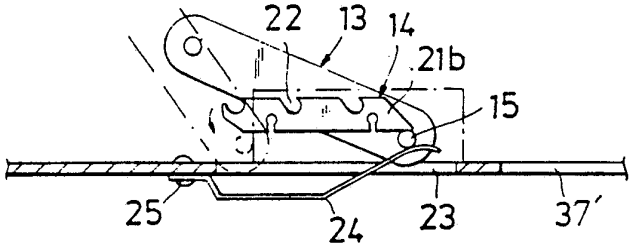
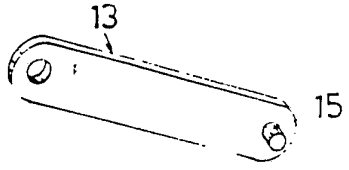


Fig. 5



INTERNATIONAL SEARCH REPORT

International Application No PCT/SE 89/00518

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) [6]

According to International Patent Classification (IPC) or to both National Classification and IPC

IPC4: A 47 B 9/00

II. FIELDS SEARCHED

Minimum Documentation Searched [7]

Classification System	Classification Symbols
IPC4	A 47 B; B 25 H

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched [8]

SE,DK,FI,NO classes as above

III. DOCUMENTS CONSIDERED TO BE RELEVANT [9]

Category *	Citation of Document, [11] with indication, where appropriate, of the relevant passages [12]	Relevant to Claim No. [13]
X	DE, C2, 3101628 (H + K MOLL FABRIK) 14 October 1982, see the whole document --	1
X	EP, A1, 0017222 (H + K MOLL FABRIK) 15 October 1980, see the whole document --	1
A	SE, C, 2901 (J.G.E. SAUER) 20 May 1890, see the whole document --	8
A	SE, B, 345194 (P G BERGMAN) 23 May 1972, see the whole document --	8

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* Special categories of cited documents: [10]

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
8th December 1989	1989 -12- 15
International Searching Authority	**Signature of Authorized Officer**
SWEDISH PATENT OFFICE	Leif Vingård

ANNEX TO THE INTERNATIONAL SEARCH REPORT
ON INTERNATIONAL PATENT APPLICATION NO. PCT/SE 89/00518

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report.

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE-C2- 3101628	14/10/82	NONE	
EP-A1- 0017222	15/10/80	NONE	
SE-B- 345194	23/05/72	NONE	